REMARKS

Claims 1 and 3-18 were presented for examination and were rejected in an Office action dated 06/07/2010. The applicants respectfully request reconsideration in light of the amendments and the following remarks.

Claim 8 has been canceled. Claim 2 was previously canceled.

All pending claims are currently amended.

The applicants note that the Index of Claims in this and in the previous Office action lacks the status of claims column from the 03/16/2010 Office action – the one immediately preceding the pending Office action.

Overview of The Distinguishing Characteristics of the Present Invention

To help understand Applicants' arguments below, the Applicants distinguish a number of characteristics of the present invention.

First, regarding terminology, applicants' specification states that the term "term" "may comprise a word or a word class." (Specification, page 7, lines 12-13; see also page 3, line 9). The incoming natural-language word(s) to be classified by the joint classifier are to be distinguished from words in a corpus. Thus, for clarity, the claim language recites "word" in reference to the former and "word-term" in reference to the latter.

Second, in contrast to prior art, the present invention relies on a combination of at least two sources of terms to be used by the disclosed joint classifier:

> [T]he joint classifier 112 uses a joint classification technique, based on **both** word terms and word term classes, to classify natural language speech received via one or more incoming calls or other communications from network 104. The word terms and word term classes are generally referred to herein as words and classes respectively.
>
> (Specification, page 4 line 27 to page 5 lines 1-3 (emphasis added).
>
> . . . .
>
> Words **and** word classes [are] utilized to provide the respective word information and word class information for use in the joint classifier . . . .
>
> (Specification, page 2, lines 25-27 (emphasis added)).
>
> . . . .

> The illustrative embodiment utilizes an automatic word class clustering algorithm to generate word classes from a training corpus, and information gain (IG) based term selection **to combine word information and word class information** for use by the joint classifier.
>
> (Specification, page 7, lines 1-3 (emphasis added).

Based on any careful reading of the Applicants' Specification, there can be little doubt that the joint classifier disclosed in the present application is based on a combination of two or more sources of terms, specifically on a source of word terms and on a source of word classes. (See also Figure 5 and accompanying text at page 11).

This distinctive combination feature is both novel and nonobvious, as discussed in more detail in the remarks below.

Third, the present invention additionally relies on information-gain (IG) calculations to select only certain terms from the combination of terms before it executes the classification functions of the joint classifier.

This distinctive selection method based on IG values of the terms in the combination is novel and nonobvious as discussed in more detail below.

The applicants respectfully submit that the amended claim language properly reflects these patentably distinguishable characteristics of the present invention.

35 U.S.C. § 112 First Paragraph Rejection of Claims 1 and 3-18

Claims 1 and 3-18 were rejected for allegedly failing to comply with the written description requirement. (Office action, page 2). The applicants respectfully submit that the amended claims overcome this rejection.

Support for Claims Found in the Specification. The applicants respectfully disagree with the Office's allegation that "all of the limitations in the amended claims are only discussed in the Li-2003 reference," which was incorporated by reference in applicants' specification at page 11. (Office action, page 3). The applicants respectfully point to the following portions of applicants' specification for support of the claims as they currently stand amended (not necessarily in sequential order of operation):

- The word classes are automatically generated. (Specification, page 3, line 19; page 7, lines 1-2). The term "word class" is defined at Specification, page 2, lines 3-5.
- Words (word terms) and word classes are combined into a combination of terms. (Specification, page 2, lines 25-27; page 7, lines 1-20). A term refers to a word (word-term) or a word-class. (Specification, page 3, lines 9; page 7, lines 12-13; page 12, line 20). Different combination techniques are disclosed in regards to Figure 5. (Specification, page 11, lines 10-26).
- From the combination of terms, some terms are selected via information-gain analysis. (Specification, page 2, lines 26-27; page 7, lines 2-5; page 11, lines 7-9).
- The terms selected via information-gain analysis ultimately "generate a set of terms for use in a term-category matrix." (Specification, page 11, lines 24-26; page 12, lines 3-5). The term-category matrix is generated from the selected terms. (Specification, page 12, lines 3-17).
- A natural-language word that is received in a communication (*e.g.*, a voice call) is analyzed to determine where to route the communication. (Specification, page 2, lines 21-25). The disclosed joint classifier performs the analysis. (Specification, page 2, lines 21-25).
- The joint classifier determines, based on the term-category matrix, at least one appropriate category for the received word. (Specification, page 2, lines 23-24). The term "category" in the context of a communications switch according to the present invention represents "a suitable destination for a given communication." (Specification, page 6, line 21-22).
- The communication switch routes the communication to a destination based on the category determined by the joint classifier. (Specification, page 3, lines 1-4; page 8, lines 18-20).

As shown in part in the passages cited above, based on these expansive and extensive disclosures in the specification per se, the applicants respectfully submit that there is substantial and sufficient support in applicants' specification for the claims as currently amended.

Claim 1 is illustrative of the currently submitted amendments to the claims. As amended, claim 1 recites:

> **1.** A method comprising:
>
> receiving, by a processor-based device, a communication that comprises a word that is a natural-language word;
>
> generating by the processor-based device a combination of terms, based on the word, comprising:
>
> (i) a set of word-terms, and
>
> (ii) a set of word-classes,
>
> wherein a term is one of a word-term and a word-class;
>
> selecting by the processor-based device a plurality of terms from the combination of terms, wherein the selecting is based on an information-gain value of each term in the combination of terms;
>
> generating by the processor-based device a matrix, wherein:
>
> (i) the matrix comprises a plurality of categories and the plurality of terms, and
>
> (ii) each term in the matrix is associated with at least one category; and
>
> determining from the matrix, by the processor-based device, a category for the word.

The applicants respectfully submit that, in accordance with the above-cited passages, the specification provides sufficient support for claim 1 and for all other amended claims herein.

Enabling Description for Selecting a Plurality of Terms. The Office alleges that "there is no enabling description for selecting a plurality of terms . . . ." The applicants respectfully disagree.

Support for the selection of a plurality of terms is found in part as follows:

> An IG-based term selection process may then be applied to the training corpus 210, in order **to generate a set of terms** for use in a term-category matrix.
>
> (Specification, page 11, lines 24-26; page 12, lines 3-5 (emphasis added)).

> . . . .
>
> A term-category matrix M may be formed using **terms** from IG-based joint term selection.
>
> (Specification, page 12, line 3 (emphasis added)).
>
> . . . .
>
> The process shown in FIG. 6 is used to select **terms** for use in the term-category matrix . . . .
>
> (Specification, page 12, lines 18-19 (emphasis added)).
>
> . . . .
>
> "Select **terms** with IG value ≥ t"
>
> (Figure 6 (emphasis added).

All the highlighted plural inflections above clearly support the recitation of a "plurality of terms" that are selected in the claim language. Therefore, the Specification provides ample support for selecting a plurality of terms, contrary to the assertion of the Office.

The applicants have also amended the claims to refer to a combination of terms, not a "union" of terms, to more closely reflect the written description.

For all these reasons, based on the above-cited references to the specification, the applicants respectfully submit that claim 1 as amended overcomes the rejection under 35 U.S.C. § 112 First Paragraph. Claims 3-18 likewise overcome this rejection for the same reasons cited in support of claim 1. Claim 8 has been canceled.

35 U.S.C. § 112 Second Paragraph Rejection of Claims 15-17

Claims 15-17 were rejected under 35 U.S.C. § 112 Second Paragraph as allegedly "being indefinite" by being "directed to an apparatus but only recit[ing] what a processor-based device does, and not what the processor-based device is." (Office action, page 6 (citing IXPL Holdings, LLC v. Amazon.com, Inc., 430 F.3d 1377 (Fed. Cir. 2005)). The applicants respectfully traverse this rejection.

First, The context of the cited portion of IXPL Holdings differs substantially from the language of the present claims, and states:

> [R]eciting both an apparatus and a method of using that apparatus renders a claim indefinite under section 112, paragraph 2. As the Board noted in Lyell, "the statutory class of invention is important in determining patentability and infringement." The Board correctly surmised that, as a result of the combination of two separate statutory classes of invention, a manufacturer or seller of the claimed apparatus would not know from the claim whether it might also be liable for contributory infringement because a buyer or **user of the apparatus later performs the claimed method of using the apparatus**.
>
> (IXPL Holdings, paragraph 36 (citations omitted) (emphasis added)).

The claim that IXPL Holdings rejected for indefiniteness recited a user interaction with the claimed apparatus as follows:

> Claim 25 recites both the system of claim 2 and a method for using that system. The claim reads:
>
> The **system of claim 2** [including an input means] wherein the predicted transaction information comprises both a transaction type and transaction parameters associated with that transaction type, **and the user uses the input means** to either change the predicted transaction information or accept the displayed transaction type and transaction parameters.
>
> (IXPL Holdings, paragraph 37 (emphasis in original)).

A user interaction with the system is recited in the IXPL Holdings claim, in contrast to the language of claim 15 of the present invention. Claim 15 as amended recites:

15. An apparatus comprising:

a processor-based device operative to:

receive a communication that comprises a word that is a natural-language word; and

classify the communication by utilizing a joint classifier that is operative to:

generate a combination of terms, based on the word, comprising:

(i) a set of word-terms, and

(ii) a set of word-classes,

wherein a term is one of a word-term and a word-class;

select a plurality of terms from the combination of terms, based on an information-gain value of each term in the combination of terms; and

determine a category of the word, based on a term-category matrix, wherein:

(i) the term-category matrix comprises the plurality of terms and a plurality of categories, and

(ii) each term in the term-category matrix is associated with at least one category.

In claim 15, there is no confusion as to "whether [a manufacturer] might also be liable for contributory infringement because a buyer or user of the apparatus later performs the claimed method of using the apparatus," (IXPL Holdings, paragraph 36), because claim 15 recites no later-performed user interaction or use of the apparatus. Thus, in carefully analyzing the context of IXPL Holdings, it becomes evident that IXPL Holdings stands for a proposition quite different than the method of amended claim 15.

Second, hardware support for the apparatus is found in applicants' specification at page 5, lines 13-20, and at page 13, lines 23-27.

Third, in regards to the Office's discussion of "selecting a plurality of terms" and "in the union of terms" on page 7 of the Office action, the applicants respectfully submit that amended claim 15 overcomes these bases for rejection as discussed above in support of claim 1.

Therefore, the applicants respectfully submit that amended claim 15 complies with 35 U.S.C. § 112 Second Paragraph, and is therefore allowable. For these reasons, and because they depend from claim 15, claims 16-17 are likewise allowable.

Claim 8 has been cancelled.

Claim 11 has been amended to overcome the rejection as follows:

> **11.** The method of claim 10 wherein a cell *i, j* of the term-category matrix ~~**comprises**~~ **represents** a classification by the processor-based device of an *i-th* selected term into a *j*-th category.

The applicants respectfully submit that amended claim 11 complies with 35 U.S.C. § 112 Second Paragraph, and is therefore allowable.

35 U.S.C. § 103 Rejection of Claims 1, 3, 5-18

Claims 1, 3, and 5-18 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Li et al., "Improving Latent Semantic Indexing Based Classifier with Information Gain," 7th International Conference on Spoken Language Processing, Sep. 2002 (referred to simply as "Li" in the pending office action, but hereinafter "Li-2002"). The applicants respectfully submit that the amended claims overcome this rejection.

Claim 8 has been canceled.

Claim 1 as amended recites:

1. A method comprising:

receiving, by a processor-based device, a communication that comprises a word that is a natural-language word;

generating by the processor-based device a combination of terms, based on the word, comprising:
(i) a set of word-terms, and
(ii) a set of word-classes,

wherein a term is one of a word-term and a word-class;

selecting by the processor-based device a plurality of terms from the combination of terms, wherein the selecting is based on an information-gain value of each term in the combination of terms;

generating by the processor-based device a matrix, wherein:
(i) the matrix comprises a plurality of categories and the plurality of terms, and
(ii) each term in the matrix is associated with at least one category; and

determining from the matrix, by the processor-based device, a category for the word.

(emphasis added)

Nowhere does Li-2002, taken alone or in combination with other references, teach, suggest, or motivate what claim 1 recites in salient part – namely that the determining of a category for the received word is based (at least in part) on a combination of terms that comprises both word terms and word classes, *i.e.*, different kinds of sources for the terms. As explained above and in applicants' specification, the use of a combination of terms from multiple sources, and particularly the combination of word terms and word classes, provides the present invention with added robustness and performance improvement over the prior art.

Li-2002 does not suggest or motivate this technique. There is simply no discussion or suggestion of more than one source of terms in Li-2002, much less of different kinds of sources. Even when the number of terms in the solitary source varies, Li-2002 is based on a single source of terms. A combination of word terms and word classes does not arise anywhere in Li-2002.

Therefore, the applicants respectfully submit that amended claim 1 overcomes the rejection and is allowable over Li-2002. Because they depend from claim 1, claims 3 and 5-

7, and 9 are likewise allowable. Moreover, the recitation of additional patentable features in these claims forms an added basis for their patentability.

Claim 10 as amended recites:

> **10.** A method comprising:
>
> receiving, by a processor-based device, a communication that comprises at least one word, wherein each of the at least one word is a natural-language word;
>
> **generating by the processor-based device a combination of terms, based on the word, comprising:**
> **(i) a set of word-terms, and**
> **(ii) a set of word-classes,**
>
> wherein a term is one of a word-term and a word-class;
>
> selecting by the processor-based device a plurality of terms from the combination of terms, wherein the selecting is based on an information-gain value of each term in the combination of terms;
>
> generating by the processor-based device a term-category matrix, wherein:
> (i) the term-category matrix comprises the plurality of terms and a plurality of categories, and
> (ii) each term in the term-category matrix is associated with at least one category; and
>
> classifying the communication by utilizing a joint classifier upon the at least one word, wherein the joint classifier comprises the term-category matrix.
>
> (emphasis added)

Nowhere does Li-2002, taken alone or in combination with other references, teach, suggest, or motivate what claim 10 recites in salient part – namely that the classifying operation for the received word is based (at least in part) on a combination of terms that comprises both word terms and word classes, *i.e.*, different kinds of sources for the terms.

For this reason and for the reasons given in support of claim 1, the applicants respectfully submit that amended claim 10 overcomes the rejection and is allowable over Li-2002. Because it depends from claim 10, claim 11 is likewise allowable. Moreover, the recitation of additional patentable features in this claim forms an added basis for its patentability.

Claim 12 as amended recites:

> **12.** A method comprising:
>
> receiving, by a processor-based device, a communication that comprises a word that is a natural-language word;
>
> **generating by the processor-based device a combination of terms, based on the word, comprising:**
> **(i) a set of word-terms, and**
> **(ii) a set of word-classes,**
>
> wherein a term is one of a word-term and a word-class;
>
> selecting by the processor-based device a plurality of terms from the combination of terms, wherein the selecting is based on an information-gain value of each term in the combination of terms, and
>
> wherein the selecting comprises:
> i) calculating an information-gain value for each term in the combination of terms that corresponds to the word,
> ii) sorting the terms in the combination of terms in a descending order of information-gain value,
> iii) setting a threshold of an information-gain value corresponding to a specified percentile, and
> iv) selecting only the terms from the combination of terms that have an information-gain value greater than or equal to the threshold to generate the plurality of terms.
>
> (emphasis added)

Nowhere does Li-2002, taken alone or in combination with other references, teach, suggest, or motivate what claim 12 recites in salient part – namely that the IG-based selecting of terms is based (at least in part) on a combination of terms that comprises both word terms and word classes, *i.e.*, different kinds of sources for the terms.

For this reason and for the reasons given in support of claim 1, the applicants respectfully submit that amended claim 12 overcomes the rejection and is allowable over Li-2002. Because they depend from claim 12, claims 13 and 14 are likewise allowable. Moreover, the recitation of additional patentable features in these claims forms an added basis for their patentability.

Claim 15 as amended was recited above. Nowhere does Li-2002, taken alone or in combination with other references, teach, suggest, or motivate what claim 15 recites in

salient part – namely that the determining of a category for the received word(s) is based (at least in part) on a combination of terms that comprises both word terms and word classes, *i.e.*, different kinds of sources for the terms.

For this reason and for the reasons given in support of claim 1, the applicants respectfully submit that amended claim 15 overcomes the rejection and is allowable over Li-2002. Because they depend from claim 15, claims 16 and 17 are likewise allowable. Moreover, the recitation of additional patentable features in these claims forms an added basis for their patentability.

Claim 18 as amended recites:

> **18.** An article of manufacture comprising:
>
> a machine-readable storage medium that is a non-transitory storage medium and that comprises software code that when executed implements the steps of:
>
> receiving a communication that comprises a word that is a natural-language word;
>
> **generating a combination of terms comprising:**
> **(i) a set of word-terms, and**
> **(ii) a set of word-classes,**
>
> wherein a term is one of a word-term and a word-class;
>
> selecting a plurality of terms from the combination of terms, wherein the selecting is based on an information-gain value of each term in the combination of terms;
>
> applying a joint classifier to determine a category of the word, wherein the category of the word is a cell in a term-category matrix; and
>
> routing the communication, based on the category of the word, to a destination terminal in a communication system that comprises the machine-readable storage medium and the destination terminal.
>
> (emphasis added)

Nowhere does Li-2002, taken alone or in combination with other references, teach, suggest, or motivate what claim 18 recites in salient part – namely that the joint classification is based (at least in part) on a combination of terms that comprises both word terms and word classes, *i.e.*, different kinds of sources for the terms.

For this reason and for the reasons given in support of claim 1, the applicants respectfully submit that amended claim 18 overcomes the rejection and is allowable over Li-2002.

35 U.S.C. § 103 Rejection of Claim 4

Claim 4 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Li-2002 as applied to claim 1, in view of of Sakai et al., U.S. Patent No. 7,099,819 B2 (hereinafter "Sakai"). The applicants respectfully submit that the amended claim overcomes this rejection.

As amended, claim 4 recites:

> **4.** The method of claim 1 wherein an automatic word class clustering algorithm is utilized to generate a plurality of word-classes from which the set of word-classes is selected.

Claim 4 depends from claim 1. As noted above, Li-2002 does not anticipate claim 1. Moreover, Sakai, taken alone or in combination with Li-2002, does not teach, suggest, or motivate the salient limitations recited for claim 1.

For example, Sakai's method of word clustering (to create word classes) does not teach, suggest, or motivate a combination of terms that comprises both word classes and individual word terms – in contrast to the salient limitation of claim 1. Sakai's category analysis cited in the Office action does not pertain to the salient limitations as recited in claim 1, because Sakai discloses no combination of word terms and word classes.

Thus, Sakai does not cure the deficiencies of Li-2002 in regards to claim 1. Therefore, there is no combination of Li-2002 and Sakai that teaches, suggests, or motivates the method of claim 1. Because it depends from claim 1, claim 4 is allowable over the cited references. Moreover, the recitation of additional patentable features in this claim forms an added basis for its patentability.

Request for Reconsideration Pursuant to 37 C.F.R. 1.111

Having responded to each and every ground for objection and rejection in the last Office action, applicants respectfully request reconsideration of the instant application pursuant to 37 C.F.R. 1.111 and request that the Examiner allow all of the pending claims and pass the application to issue.

If there are remaining issues, the applicants respectfully request that Examiner telephone the applicants' attorney so that those issues can be resolved as quickly as possible.

Respectfully,

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